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ABSTRACT

Project PLAN* is a computer managed, individualized learning system developed by the Westinghouse Learning Corporation, and adopted in the St. Louis Public Schools. A summative evaluation of the system was performed. The use of a computer in Project PLAN* allows the teacher more time to spend with individual students and contributes toward record keeping and feedback on student progress. Project PLAN* was evaluated in the elementary grades using the Metropolitan Achievement Test in grades 1, 2, 3 and using the Iowa Test of Basic Skills in grades 4, 5, 6, 7. Affective measures were also used to determine the difference in the students' self-esteem, general anxiety, and test anxiety. Other activities of the evaluation included student and teacher questionnaires and a cost analysis. Mixed results were reported in the evaluation, some of which could be attributed to known contamination of the data. (WH)

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DON'T PROGRAM THE WORLD - PLAN* IT

A Paper Presented at:

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PROGRAM DESCRIPTION - G. Johnson

PLAN* is a computer managed individualized learning program that allows each student to learn at his own rate in several subject areas at the same time. One of the outstanding features of the program is that the entire learning process receives daily guidance from an IBM computer. The computer helps the teacher plan student instruction and keeps track of student progress by scoring and analyzing tests, keeping up with progress and providing day-to-day objectives for learning.

PLAN* has two major goals. The first goal is to provide each child with an individualized program of studies in Language Arts, Mathematics, Science and Social Studies. The teacher modifies the P.O.S. to fit the student's particular needs.

The second goal is to involve students in making decisions and assuming responsibility for their own learning.

The school principal has full responsibility for PLAN* in his school. He selects and trains the teachers who are working PLAN*.

There are two coordinators who assist the school principal by:

1) working with the children and teachers.....
and
2) carrying out administrative tasks related to the implementation of the program and coordination with evaluator and director.

The project director is responsible for every phase of the program.

She reports to the Director of Curriculum Services, works with teachers and students, works with outside contracting agencies, makes recommendations for project changes, supervises writing curriculum materials and is in charge of dissemination of the project information.

In PLAN* classrooms, there is a variety of materials that are neither too hard nor too easy. Each child can proceed at his own pace. With an older child reading below grade level, a teacher can maintain the child's interest by adding enrichment and motivational activities to the learning units provided by the system. PLAN* manuals contain all information a teacher needs to begin to use the PLAN* individualized program.

Teachers know exactly what students are expected to learn and what criteria to use in deciding whether or not a student has mastered an objective.

Teachers are informed of the daily progress of each student. A progress report shows the specific objectives each student has mastered, the ones he is currently working on and what is still scheduled for him to do. Much of the teacher's job of record keeping in PLAN* is done by the computer.

Teaching Learning Units (TLU'S) have been provided for each objective in PLAN*. Some TLU's are filed in the classroom. Others are stored in a special place in the building. Students may go to TLU storerooms to withdraw additional TLU's or objective tests under the direction of the teacher or administrator. A TLU spells out the objective the child will study,

lists materials to use and activities to do in order to achieve the objective. Teacher aides assist the teacher in monitoring the program.

Some learning activities require students to work in small groups. Others require students to work alone. When a child feels he can master the objective of a TLU, he is tested individually. Testing is very important in individualized instruction. Each child is measured against his own potential.

Two Curriculum Writers have the challenging task of creating local TLU's that are not available in the PLAN* curriculum. The writers work with the Division of Curriculum Services, PLAN* students, teachers and administrators. They have developed TLU's for the U. S. Constitution and Black Studies for the middle grades, Scott Foresman Systems, Levels 1,2,3,4 and they are working on completing Systems.

PROGRAM EVALUATION - E. Patterson

This paper focuses on the results of the summative evaluation data prepared by the evaluator. A literature search was made prior to preparation of the evaluation model. The academic success of the program was evaluated using the Metropolitan Achievement Test in grades 1-3 and the Iowa Test of Basic Skills in grades 4-7. Affective measures used to determine the differences in the students self-esteem, general anxiety and test anxiety. The effectiveness of various teaching patterns in PLAN* classrooms were analyzed using the results of classroom observations. The instructional program used in PLAN* and Comparison classrooms was analyzed by the degree of

satisfaction of administrative personnel, operational personnel and parents of students in PLAN*. Cost Analysis of both instructional systems was studied and reported. Recommendations for the subsequent years are based on the analysis of the data gathered.

The evaluation model was designed to examine how PLAN* teachers implemented the individualized learning system rather than observe differences between comparison and PLAN* classrooms. Previous research documented in ERIC publications indicated that PLAN* teachers spend more time in individual and small group instruction than regular classroom situations. PLAN* teacher training emphasizes individualized instruction. Therefore this aspect of the study was not repeated in this evaluation.

Two out of seven grade levels did better academically with PLAN*, two grade levels indicated no difference. Grade 1 and grade 3 achieved significantly better using PLAN* (See Exhibit 1). Grade 4 and grade 6 achieved significantly better in Comparison classrooms (See Exhibit 2). The significance level in each case was greater than .01. (I.e. There is less than 1 chance out of 100 that the distribution of scores would occur by chance alone). Grades 2,5 and 7 showed no significant differences in achievement between PLAN* and Comparison c assrooms.

The three affective measures used were the Self-Esteem Inventory (S.E.I.), General Anxiety Scale for Children (GASC) and the Test Anxiety Scale for Children (TASC). Three out of six grade levels had a higher self-esteem or less anxiety, in PLAN* classroom instruction, one grade level showed less test anxiety and self esteem and two grades showed no significant difference.

Primary students in grades 1 and 2 showed less anxiety in PLAN* classrooms than in Comparison classrooms (See Exhibit 3 - Comparison data for Grade 3 unavailable.) Grade six PLAN* students showed more self-esteem, grade four Comparison students showed more self-esteem and less test anxiety, grades 5 and 7 showed no statistically significant differences (See Exhibit 4). The level of significance for the comparisons discussed above are:

Grade 1 -	GASC	(Post Test)	.023
Grade 2 -	GASC	(Post Test)	.040
	TASC	(Pretest)	.021
	TASC	(Post Test)	.001
Grade 4 -	SEI	(Post Test)	.004
	TASC	(Pretest)	.001
	TASC	(Post Test)	.001
Grade 6 -	SEI	(Pretest)	.001
	SEI	(Post Test)	.001

The most accurate measure of a PLAN* student's academic achievement (in the evaluators opinion) seems to be weighted score derived from totaling the values assigned to each objective mastered. PLAN*-C curriculum is a hierarchical structure of behavioral objectives with criterion measures for achievement aggregated into learning units called modules. Modules may have as few as 1 objective or as many as 15. Each objective has a cognitive difficulty level based on Benjamin S. Bloom's Taxonomy of Educational Objectives[1]. The weighted score is derived by totaling the objective values within each module mastered by each student (See Exhibit 5). This total mastered value (TMV) score was used for comparisons. Total mastered values correlate significantly with ITBS scores in 3 out of 4 grade levels. TMV correlates significantly with SEI Post Test scores in 2 out of 4 grades

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[1]Benjamin S. Bloom, Taxonomy of Educational Objectives, David McKay Co., Inc., New York, 1956.

levels. TMV does not correlate significantly with GASC Post Test (either positively or negatively) at any grade level (grades 4-7). TMV correlates significantly with TASC Post Test scores in 2 out of 4 grade levels. The level of significance for the comparisons discussed above are:

Grade 4 -	ITBS Comp. G.E. with TMV	.10
Grade 5 -	ITBS Comp. G.E. with TMV	.02
Grade 6 -	ITBS Comp. G.E. with TMV	.01
	SEI (Post Test) with TMV	.01
	TASC (Post Test) with TMV	.01
Grade 7 -	SEI (Post Test) with TMV	.01
	TASC (Post Test) with TMV	.01

No statistically significant difference was associated with observed teaching patterns and academic success. The data used was based on ITBS mean composite Grade Equivalent (G.E.) gain in grades 4-7. Eight out of the twelve classrooms showed a teaching pattern of relatively high individual interaction, low group interaction and high classroom management activities. The other 4 classroom patterns showed relatively high individual interaction, somewhat lower group interaction and a lower frequency of classroom management activities.

In response to questionnaires, students in 12 out of 13 PLAN* classrooms indicated higher satisfaction than did students in Control classrooms and teachers in all PLAN* classrooms indicated higher relative satisfaction than did Control teachers. Based on a 5 point scale with 5 the most satisfaction and 1 the least, the mean response for PLAN* teachers was 3.78 and the mean response for Control teachers was 3.11. A Pearson product moment correlation (r) between the mean classroom scores on the questionnaire and the Class Average Composite Grade Equivalent (G.E.) scores on ITBS Post Tests showed no statistical significance. All other categories

of persons responding to questions regarding satisfaction with PLAN* were more favorable than unfavorable. Mean scores by categories responding were:

PLAN*	Principals	3.54
PLAN*	Administrative Assistants	3.64
PLAN*	Librarians[1]	3.79
PLAN*	Teacher Aides	4.21
PLAN*	Terminal Operators	4.25
Parents of Students in PLAN* Classrooms		3.94

The average cost per pupil for PLAN* students is currently very high due to developmental start-up costs. As the program is implemented, costs decrease dramatically:

1) Once materials have been purchased for a PLAN* classroom, the start-up costs disappear and normal financial operational costs return.
2) "PLAN*-A" to be implemented in Fiscal Year 1974, will cost only half what "PLAN*-C" cost during Fiscal Year 1973.
3) A test-run to determine feasibility by running PLAN* on the St. Louis computer facility is scheduled for February. Costs would decrease at that time.
4) A decrease in the teacher to teacher aide ratio from one aide per teacher to one aide per two teachers was implemented in September, 1973.
5) Writing modules for use with existing St. Louis tests will eventually decrease start-up costs (due to the fewer new materials required).
6) The more students in PLAN*, the lower the cost per pupil ratio becomes.
7) The costs for PLAN* are expected to decrease during the project's years to a point that the Board of Education can afford to implement PLAN* in schools throughout the city at a cost not exceeding that of regular classrooms.

Caution should be used in interpreting the 1st year data:

1) The 1973 data is contaminated in grades 4-7 due to the pre-test being given in the Spring and the post test being given the following year rather than Winter and Spring at the start and finish of the project's first year (The program had a mid-year start-up).

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[1] Librarians in PLAN* schools. (There is not a separate PLAN* library).

2) The two grade levels showing significant gains with PLAN* were both primary and were measured with a different test and measured precisely the same amount of time the program was in operation rather than over a total year of half PLAN*, half regular classroom instruction. (The evaluator feels that this measurement is more reliable than the ITBS data).
3) The two grade levels showing significant gains with Control classroom instruction had the benefit of the District's Vocabulary Development Project (A city - wide program).
   - The effects of not using the Vocabulary Development Project should be studied along with other possible influencing factors such as other special projects in operation.
   - The possible use of Vocabulary Development project programs on an individual basis at the option of the student and teacher should be explored.
4) A follow - up on the Total Mastered Value (TMV) study (derived by totaling the values assigned to the cognitive level of the objectives successfully completed) should be undertaken by the evaluator during Fiscal 1974.
   - A conversion table should be secured from Westinghouse Learning Corporation. (This is needed to compare PLAN*-A and PLAN*-C).
   - A study of first-year sub-test scores on the ITBS should be initiated by the evaluator to determine how well students in PLAN* did by subject matter areas.

Use of affective measures should continue but the General Anxiety Scale for Children (GASC) will be discontinued.

1) The instrument is more home oriented than school oriented and correlates highly with the Test Anxiety Scale for Children (TASC).
2) The Self-Esteem Inventory (SEI) tests should be continued.
3) A different factor measured with another affective instrument is the "My Class". This measures the way a student feels about his classmates and assesses the climate of the learning environment.

Additional costing information needs to be made available to facilitate cost benefit analysis:

1) A more formal cost-benefit analysis should be undertaken by the evaluator for the second project year.
2) A better system for gathering required data should be explored with appropriate divisions.

The questionnaires used to measure satisfaction with the instructional system should be revised.

1) Sampling the population would probably be sufficient for analysis.
2) Questionnaire responses should be machine scoreable.

The test-run of data and the associated routing of cards and printouts must be proven before release of the Iowa City lines should be considered.

1) Daily turnaround should be achieved each day for one month implementation.
2) Accuracy of the data stored and retrieved should be verified daily for one month before implementation.
3) A five-year implementation plan should be drafted by the Evaluation Division to be used following the first three project years should the project prove to be cost-effective and beneficial academically.

The very short (about 4 months) start - up period was critical to the comparisons made.

1) Both the positive and negative results should be treated very cautiously in judging success of the program.
2) At the end of the second year, results will be more reliable.

PLAN* ILLUSTRATED - G. Johnson

Between the program description and evaluation results a vicarious trip through PLAN* classrooms was simulated through the use of a locally developed slide/tape presentation and the Westinghouse Learning Corporation's Teaching Learning Unit (TLU) Number 0800-1, "Seeing is Believing". (See Sample.)

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EXHIBIT 1

ST. LOUIS PUBLIC SCHOOLS

METROPOLITAN ACHIEVEMENT TEST RESULTS

A COMPARISON BETWEEN PLAN* & CONTROL

CLASSROOMS: GRADES 1 - 3

PRIMARY GRADES

GRADE 1

PLAN* ACHIEVEMENT WAS SIGNIFICANTLY GREATER THAN THE CONTROL ACHIEVEMENT. THE LEVEL OF SIGNIFICANCE WAS GREATER THAN .01.

GRADE 2

THERE WAS NO SIGNIFICANT DIFFERENCE.

GRADE 3

PLAN* ACHIEVEMENT WAS SIGNIFICANTLY GREATER THAN THE CONTROL ACHIEVEMENT. SIGNIFICANCE LEVEL EXCEEDED .01.

NOTE: A SIGNIFICANCE LEVEL OF GREATER THAN .01 MEANS THAT THERE IS LESS THAN 1 CHANCE IN 100 THAT THE DISTRIBUTION OF SCORES WOULD OCCUR BY CHANCE ALONE.

EXHIBIT 2

ST. LOUIS PUBLIC SCHOOLS

IOWA TESTS OF BASIC SKILLS - TEST RESULTS

A COMPARISON BETWEEN PLAN* & CONTROL

CLASSROOMS: GRADE 4 - 6

MIDDLE GRADES

GRADE 4

CONTROL ACHIEVEMENT WAS STATISTICALLY SIGNIFICANTLY GREATER THAN THE PLAN* ACHIEVEMENT. THE LEVEL OF SIGNIFICANCE WAS GREATER THAN .01.

GRADE 5

THERE WAS NO SIGNIFICANT DIFFERENCE.

GRADE 6

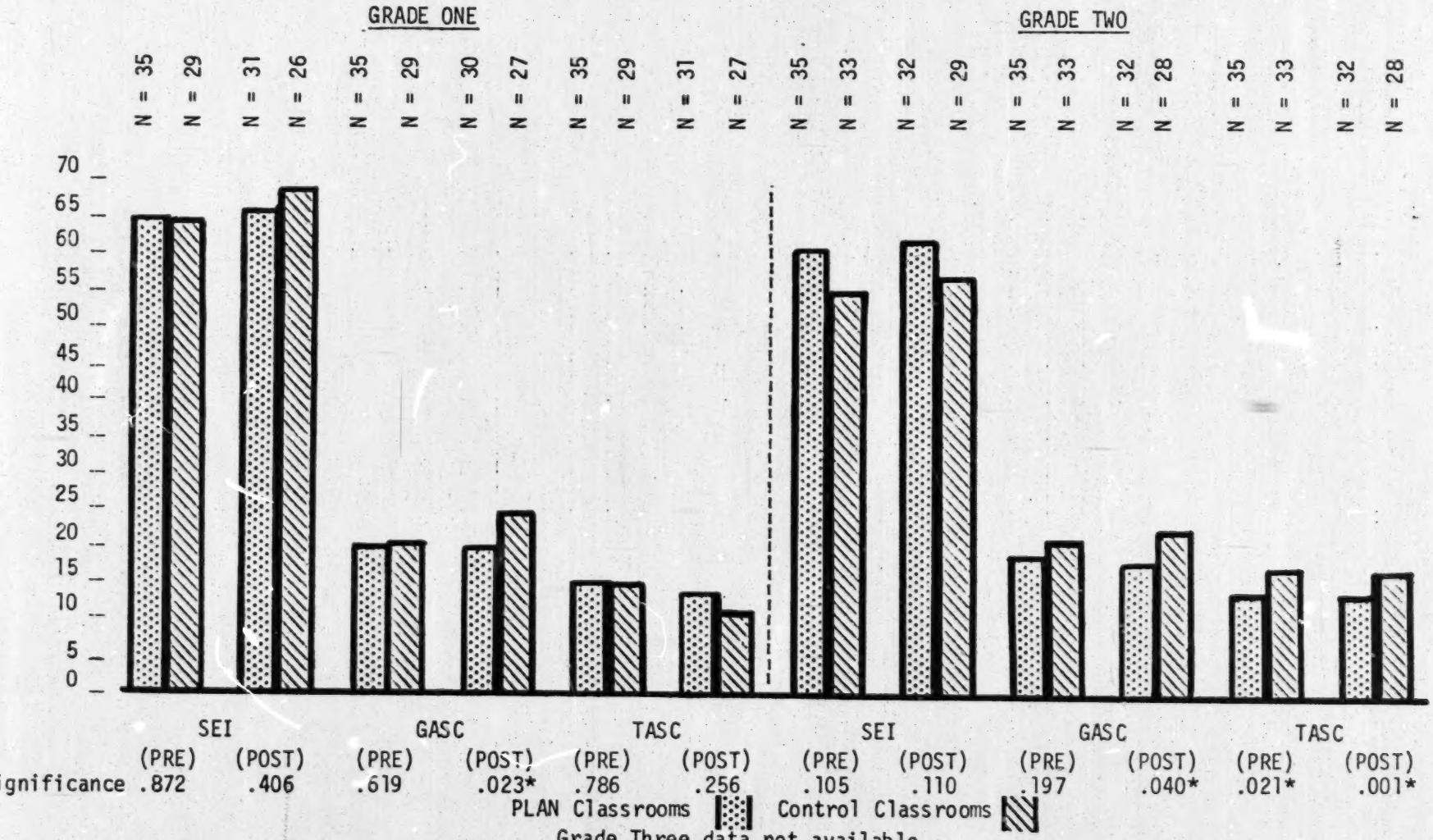
CONTROL ACHIEVEMENT WAS SIGNIFICANTLY GREATER THAN THE PLAN* ACHIEVEMENT. SIGNIFICANCE LEVEL EXCEEDED .01.

NOTE: A SIGNIFICANCE LEVEL OF GREATER THAN .01 MEANS THAT THERE IS LESS THAN 1 CHANCE OUT OF 100 THAT THE DISTRIBUTION OF SCORES WOULD OCCUR BY CHANCE ALONE.

EXHIBIT 3

ST. LOUIS PUBLIC SCHOOLS

SEI, GASC & TASC RESULTS - GRADES 1 - 3

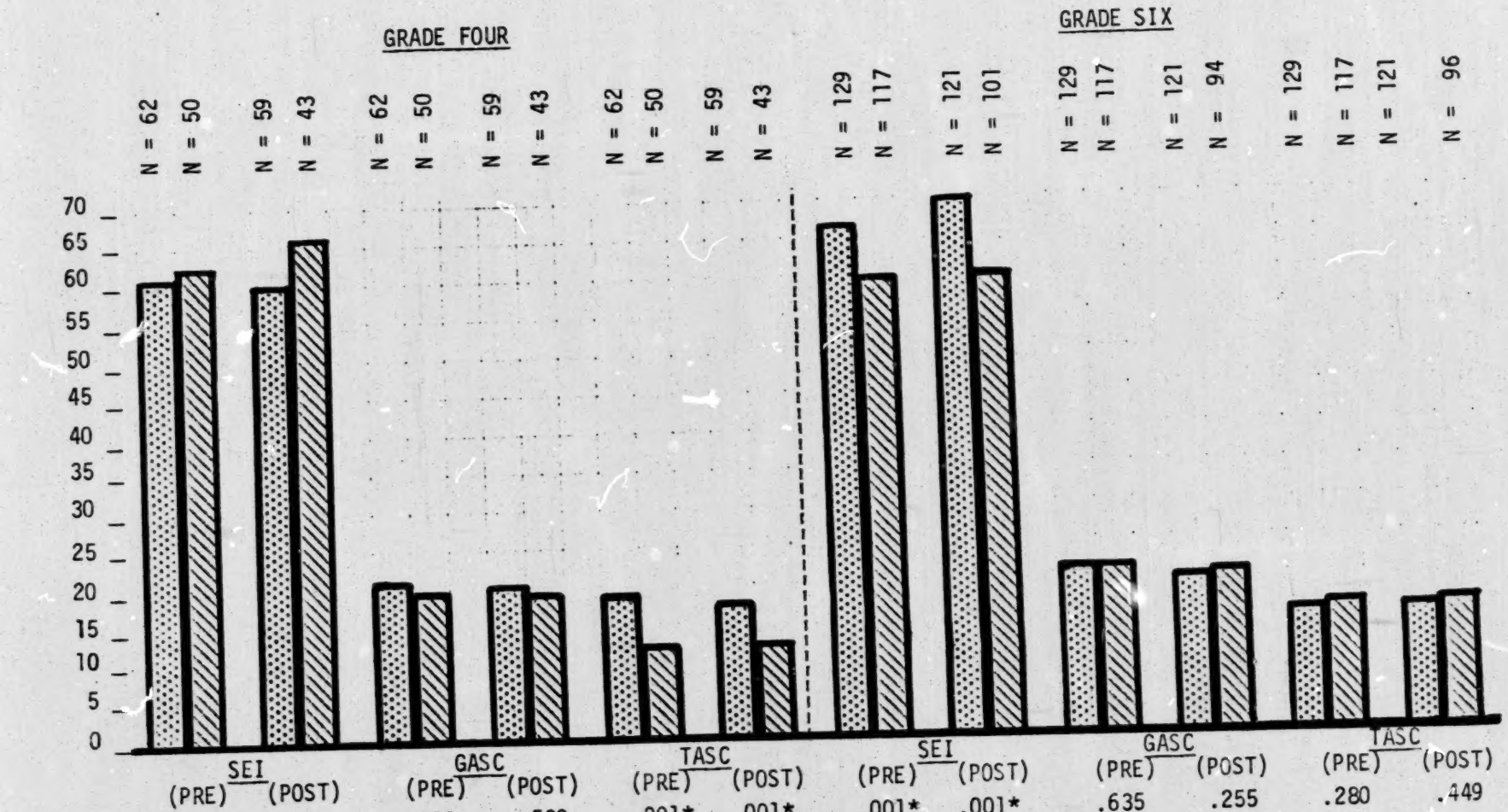

GRADE ONE
GRADE TWO
N = 35 N = 29 N = 31 N = 26 N = 35 N = 29 N = 30 N = 27 N = 35 N = 29 N = 31 N = 27
N = 35 N = 33 N = 32 N = 29 N = 35 N = 33 N = 32 N = 28 N = 35 N = 33 N = 32 N = 28
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
SEI GASC TASC SEI GASC TASC
(PRE) (POST) (PRE) (POST) (PRE) (POST) (PRE) (POST) (PRE) (POST) (PRE) (POST)
Significance .872 .406 .619 .023* .786 .256 .105 .110 .197 .040* .021* .001*
PLAN Classrooms
Control Classrooms

Grade Three data not available

EXHIBT 4

ST. LOUIS PUBLIC SCHOOLS

SEI, GASC & TASC RESULTS - GRADES 4 - 6


GRADE FOUR
GRADE SIX
N = 62 N = 50 N = 59 N = 43 N = 62 N = 50 N = 59 N = 43 N = 62 N = 50 N = 59 N = 43
N = 129 N = 117 N = 121 N = 101 N = 129 N = 117 N = 121 N = 94 N = 129 N = 117 N = 121 N = 96
70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
SEI (PRE) (POST)
GASC (PRE) (POST)
TASC (PRE) (POST)
SEI (PRE) (POST)
GASC (PRE) (POST)
TASC (PRE) (POST)
Significance .618 .044* .212 .530 .001* .001* .001* .001* .635 .255 .280 .449
PLAN Classrooms
Control Classrooms

Grade Five - No Significant Difference .

EXHIBIT 5

ST. LOUIS PUBLIC SCHOOLS

SAMPLE CALCULATION OF A TMV

STUDENT "A" MASTERED MODULES 10-102, 20-103, 30-202, & 40-110

MASTERED MODULE NO.	OBJECTIVE NOS.	COGNITIVE VALUE
10-102	0772	2
	0791	2
20-103	1037	3
30-202	2280	1
	2281	2
40-110	1447	3
	1448	1
	1450	1
		15 TOTAL MODULE VALUE (TMV)

EXHIBIT 6

ST. LOUIS PUBLIC SCHOOLS

TMV CORRELATION RESULTS

	TMV WITH ITBS POST TEST	TMV WITH SEI POST TEST	TMV WITH GASC POST TEST	TMV WITH TASC POST TEST
GRADE 4	SIG. = >.10	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
GRADE 5	SIG. = >.02	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
GRADE 6	SIG. = >.01	SIG. = >.01	NOT SIGNIFICANT	SIG. = >.01
GRADE 7	NOT SIGNIFICANT	SIG. = >.01	NOT SIGNIFICANT	SIG. = >.01

NOTE: SIG. = >.10 MEANS THAT THERE IS 1 CHANCE IN TEN OF OBTAINING A SIMILAR DISTRIBUTION OF SCORES BY CHANCE ALONE.

SIG. = >.02 MEANS A CHANCE OF 2 OUT OF 100

SIG. = >.01 MEANS A CHANCE OF 1 OUT OF 100